

NASA

*Expanding The Horizons Of Communications*

GSFC

*Space Communications Program - Code 450***Inside This Issue:**

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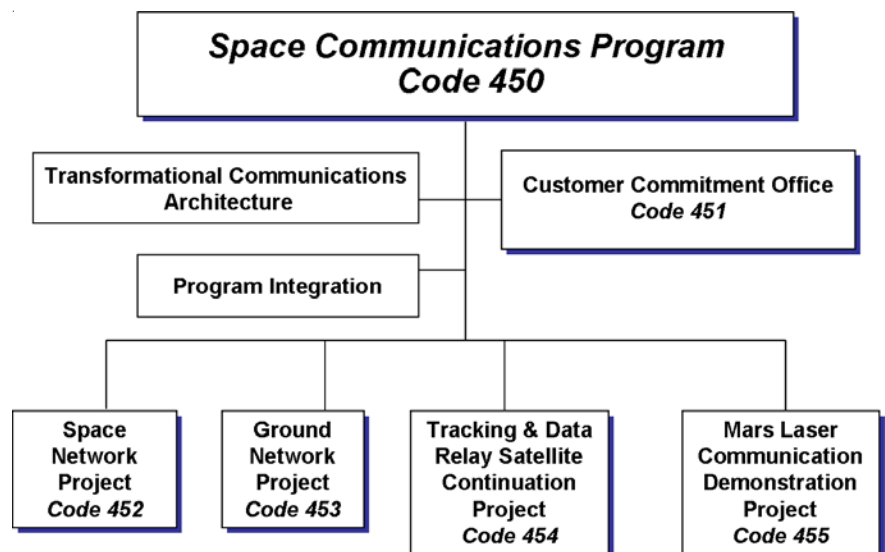
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**Page 26****Space Communications Program***Our new name!*

On April 4<sup>th</sup> 2004, the Mission Services Program officially became the Space Communications Program. The name has been carefully chosen to best reflect the work we do here in Code 450. Space Communications is our mission, and now we have a name to convey that. Along with a new name, we've solicited suggestions from the Code 450 team for a new logo and slogan and put it out for a vote. We've received over 85 logos. The management team has selected the winner from the top three vote getters. The winning logo will be revealed soon!



## A Message from the Associate Director / Program Manager for Space Communications

"The only thing that's constant is change" a very wise but anonymous man once noted. This rings especially true in the Space Communications Program. Exciting things are happening and future opportunity beckons. Let me begin with our name change from Mission Services Program to Space Communications Program. This title was chosen to better reflect our current core focus on space communications and tracking in the post CSOC era. Besides the name change we have also established the MARS Laser Communication Demonstration (MLCD) as an official project in Formulation and added the Satellite Laser Ranging systems as an element of the Ground Network Project. I welcome these new activities and the people who make them happen to our team and ask for your support to make them successful. Also changed is the title of this newsletter from "The Integrator" to "The Space Communicator". Again, this is reflective not only of our new focus, but also of recent staff changes. After twelve outstanding years leading the Integrator team, Lynn Meyers has decided to pass the baton to Rosemary Bruner. Lynn and her outstanding team of Lena Braatz and Sherri Tearman have certainly set a challenging standard for the future by consistently producing a highly informative and professional publication. Please see the article, "Thanks to the Integrator Team" for a more complete summary of their history and accomplishments. I feel compelled, however, to add my personal acknowledgement for their great work. Thank you for a job well done!

By now we've all heard of the new Space Exploration initiatives. With our current and planned capabilities, the Space Communications Program is well positioned to play a significant role enabling these missions. The future is exciting and certain to challenge our professional skills, creativity and imagination. I continue to ask you for your best efforts to make these dreams a reality while continuing to make today's missions successful. This year will continue to be busy with AURA, SWIFT, Shuttle (return to flight), and many other missions preparing for launch, continued increasing workloads on our networks, and many new opportunities there for us to pursue.

In this, the first edition published by Rosemary and her new team, we have many exciting events and numerous accomplishments to report. In March Goddard Space Flight Center and Northrup Grumman Corporation received jointly

the National Space Clubs Nelson P. Jackson Award, which is given in recognition of exceptional teamwork between government and industry in the missile, aircraft and space fields. The award recognizes the challenges and accomplishments associated with establishing and operating the TDRSS. This is a tremendous honor for the hundreds of men and women who have worked on this program over the past 25 years. Congratulations to all of our team members who made it happen! The newsletter also welcomes several new staff members to our program team. I encourage you to take an opportunity to get to know these very talented people and personally welcome them to our team.

As I write this article we continue to be challenged with the transition to full cost accounting and a new suite of rules and tools to help with the transition. I ask for your continued perseverance to make this transition successful. Such a fundamental change is difficult and cannot be expected to be accomplished without some pain. Talking about new tools, NGIN Is Coming! The Next Generation Integrated Network is about to be implemented within the Space Communications Program after excellent experience in other Code 400 projects. This is a Data Management system that was originally developed for use on James Webb Space Telescope (JWST), and has been modified to meet the specific needs of the Space Communications Program. The system will provide significantly enhanced connectivity and information management for both NASA and its contractors in the area of program analysis and control. The system has started initial use in the MLCD project, and orientation training will be provided in the near future.

In closing, I would like to continue to emphasize the critical importance of maintaining and improving our highly skilled workforce. There are numerous technical and management classes available through GSFC and our contractor teams. Take the initiative and develop yourself. Let us arm ourselves with knowledge as we strive to reach our full potential and turn to the challenges of the future.

**Phil Liebrecht**

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## Space Communications Program

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## ***Goddard Captures Prestigious Nelson P. Jackson Aerospace Award***



**(from l to r: Roger Flaherty, Phil Liebrecht, Bob Spearing)**

### ***GSFC Press Release: 04-20***

NASA Goddard Space Flight Center and Northrop Grumman Corporations Space Technology sector have been awarded the National Space Clubs 2004 Nelson P. Jackson Aerospace Award, named in honor of the Clubs founder and past president. The annual award is presented to recognize exceptional teamwork between government and industry in the missile, aircraft and space fields.

"We are honored to receive this prestigious award," said Phil Liebrecht, Associate Director and Program Manager for Space Communications at NASA Goddard Space Flight Center.

"NASA and the space community have long recognized the revolutionary and science enabling capabilities of this one-of-a-kind space communications system, which continues to evolve to meet mission-critical needs."

The Space Communications Program at Goddard is responsible for planning, developing and implementing NASA's worldwide near-Earth space communications networks, which include operations and development of the TDRSS and Space Network. Northrop Grumman was responsible for the design, fabrication, and testing of the original series TDRS 1-7.

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*Jackson Award (from page 4)*

When NASA launched TDRS-1 in 1983, it was the largest and most sophisticated communications satellite ever built. Five additional Northrop Grumman (then TRW) built satellites were subsequently placed into orbit through 1995 (TDRS 2 was lost aboard the Shuttle Challenger). All of the original series spacecraft are still on-orbit and functioning, serving human Earth-orbiting and robotic science missions, as well as other national missions and commercial users.

NASA launched three replenishment spacecraft in June 2000, March 2002 and December 2002, built by Boeing Satellite Systems. The entire TDRS fleet and their associated ground control facilities comprise the Tracking and Data Relay Satellite System, a sophisticated communication signal relay system that transmits voice and television, as well as digital and analog data between user satellites and Earth-based control centers. The system greatly enhances the productivity of space assets by transmitting and receiving data from customer satellites over their entire orbit, compared to just 15 percent previously provided by ground stations.

March 22, 2004

**Susan Hendrix**

Office of Public Affairs

Goddard Space Flight Center, Greenbelt, MD

For more information about NASA's Space Network and Tracking and Data Relay Satellite System, go to: <http://nmssp.gsfc.nasa.gov/tdrss/>

Phil Liebrecht, in an e-mail sent to Program personnel March 22, 2004, says in part, *"This award rightly belongs to you, the hundreds of dedicated men and women who conceived, developed and operated this system over a period of more than 25 years...The citation starts with these words: "TDRSS has profoundly altered the state of Earth-orbit communications." and continues with "Data relayed through TDRSS has been critical to scientists investigating both near and deep space phenomena and earth science." On behalf of the entire NASA management team, thank you for making this possible. With your continued dedication to mission excellence I look forward to a bright and fulfilling future. Congratulations!"*

Al Diaz, Center Director, expressed his congratulations in an e-mail dated March 22, 2004. The e-mail says, *"I was privileged to be in the crowd on Friday when Phil received this award on all of our behalf. It was great to see it happen but I must say that the significance of the award was enhanced today at the VITS when Bill Readdy recognized it as being "long overdue". I agree with that. Safe conduct of the Human Space Flight Program has been enabled by the capability provided by everyone at Goddard involved in this activity, Civil Servants and contractors. This is indeed an honor for all of them but one that is well deserved and long overdue. Please pass my thanks and congratulations to all."*

## Systems Advisory Committee

The Systems Advisory Committee (SAC) was formed to provide a forum for discussion of system issues. Based on findings, recommendations are made to Code 450 management for possible further action/direction to the Project Managers. External advice is also provided from outside of Code 450, based on the Independent Technical Authority recommendation from the Columbia Accident Investigation Board (CAIB) report. The SAC will not infringe on any existing Project Management (PM) responsibilities, and will not duplicate any existing project Configuration Control Boards (CCBs). The

first SAC meeting was convened on February 4, 2003; the main topic of discussion was options for follow on TDRSS. More SAC meetings will be conducted.

The SAC staff is comprised of Frank Stocklin/Code 450, Ted Sobchak/Code 453, Bryan Gioannini/Code 452, Tom Gitlin/Code 452, John Martin/Code 451, Jon Walker/Code 451, Dave Israel/Code 567, Ken Perko/Code 567, Ed Lowe/Code 454, and Dave Taylor/NENS Architect.

**By Frank Stocklin**

## A New Challenge for a Talented Team!

The Space Communicator team is excited to be rolling out its inaugural edition of the Space Communications Program newsletter. The Program is newly reorganized, with a new name, so a change to our venerable newsletter was in order, too. We've taken this opportunity to develop our own format and identity while continuing so many elements that made the Integrator so successful.

With that in mind, we have changed the format in minor ways to reflect our effort to make this newsletter our own while providing interesting and informative articles for your enjoyment. We have borrowed and modified one of the logo contest submissions, making it the backdrop for our new Space Communicator banner on the front of this edition. We have added a section entitled "SCP People and Announcements" to bring you up to date on more personal 'happenings' that are going on within our Space Commu-

nications family and to welcome newcomers to our midst. Be sure to stop by and add your welcome to ours.

The PAAC Team has put forth outstanding effort to bring the Communicator to you. They have diligently worked with many of our technical leads to bring together a really interesting set of articles for each of our Program elements. Publishing this instrument was a new charter for our PAAC team and they have really stepped forward with a lot of talent and ingenuity to bring this first edition to you. I have certainly enjoyed getting to know more of the team and see what a broad spectrum of talent we have in the first floor north hallway!

I look forward to working with this fine team as we continue to refine our publication effort, and welcome suggestions from our readers for future editions.

**By Rosemary Bruner**

## Quality Assurance across SCP



The Space and Ground Network projects once again have representation from the Office of Systems Safety and Mission Assurance (OSSMA), Code 300. A Systems Assurance Manager (SAM), Patricia Huber, and a Quality Engineer (QE), Peggy Reno, have been assigned to monitor the Near Earth Networks Systems contract.

Typically, the SAM provides independent technical support, including risk assessment and guidance to all flight programs, and ensures an appropriate level of independent verification and validation. The SAM works with the projects, providing additional resources to develop specific policy requirements for acquiring and managing elements such as:

- materials, parts, and process support
- reliability
- hardware and software assurance
- systems safety
- mission support process reviews

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*Quality Assurance (from page 6)*

The SAM has delegated the following duties to the QE for quality assurance insight to both the products under development, and current operations. The QE:

- reviews quality plans and other documentation
- advises on procedures
- participates in Configuration Control Board meetings
- conducts process verification
- witnesses environmental and acceptance tests
- participates in peer reviews (i.e.: SDR, PDR, CDR, TRR, ORR)
- monitors the ISO compliance of the program, the sites, and the contractors
- acts as the liaison between the products/projects and the SAM

Currently the QE is supporting the Second Guam Antenna System (SGAS) and other product development activities.

This quality assurance insight allows an objective view into the products and services supplied by the Space and Ground Network projects. The importance of independent safety and mission assurance assessments cannot be overstated. And, once again, the Space Communications Program product design leads can take advantage of this vital service.

**By Peggy Reno**

## Thanks to the Integrator Team

### Integrator Retrospective

The *SN Integrator* newsletter was first published in January 1992 and continued through November 2003. During that time, the publication has shared news about Space and Ground Network activities, Flight Dynamics activities, and customer activities. It has provided information about our organizational changes (from Code 530 to Code 450) and contract service changes (SEAS and NMOS to CNMOS, CSOC, and now NENS and MOMS). The name changed to *The Integrator*, and the publication has been electronically available from the Code 450 Website.

The initial driver for the publication was the development and integration of the Second TDRSS Ground Terminal. It was one of several tools implemented to facilitate that very complex activity. *The Integrator* survived the initial transition and went on to share news about the White Sands Ground Terminal Upgrade and integration, the addition of the Guam Remote Ground Terminal, and changes to the Ground Network resources as well as significant activities in the customer community and Flight Dynamics organization.

The SN and GN customers have been terrific about providing interesting articles about their satellite activities and science. The Flight Dynamics Facility has provided many interesting articles. There were also articles submitted about new space communications technologies.

The staff consisted of Lena Braatz, Sherri Tearman, and myself. Lena has been an exceptional editor (applause!); Sherri has done a fantastic job with the

layout, coordination with Goddard's technical publications organization,

and distribution (more applause!). Contributions have come from flight operations teams, science teams, project development teams, and flight dynamics personnel, among others. It has been an honor to be part of this activity; I have received positive feedback with each issue. Thanks to all of you for your participation and, please, keep up the good work with the new publication!

**By Lynn Myers**



## SCP Quality Objectives

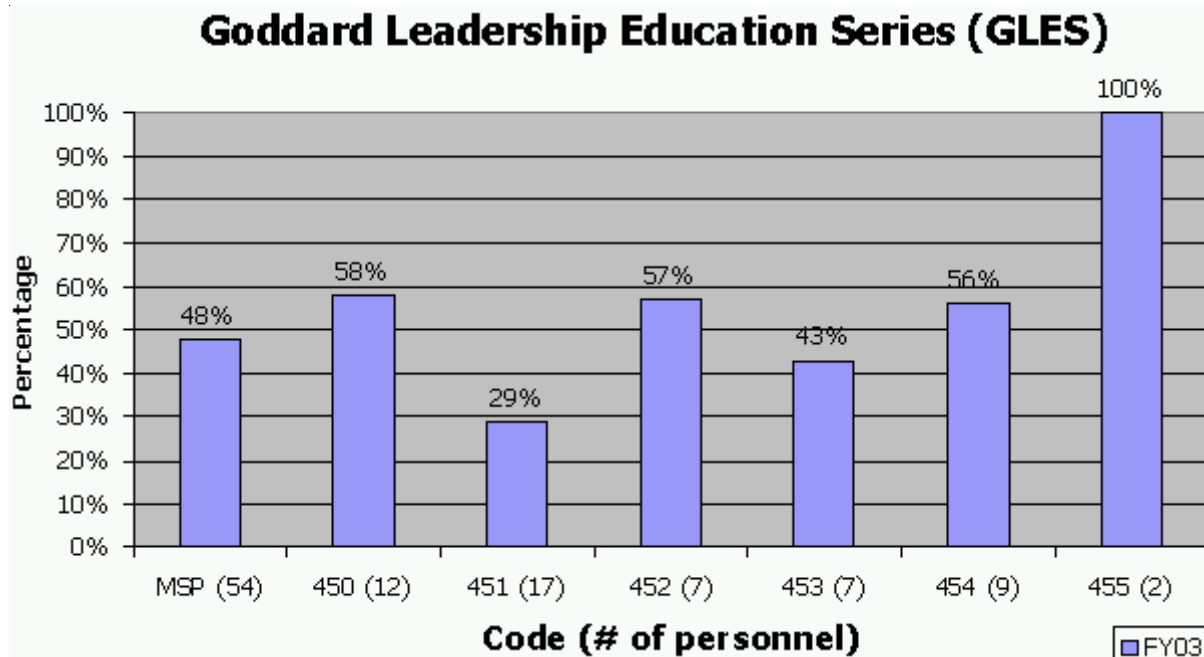
The Flight Program and Projects Directorate (FPPD) has identified applicable goals from the GSFC Strategic Implementation Plan as its Quality Objectives. FPPD Quality Objectives and the associated metrics are shown in 400-PG-8730.3.1, *Quality Management System Implementation for FPPD*. As required by this PG, the Space Communications Program (SCP), formerly Missions Services Program (MSP), has taken a subset of these goals and developed SCP Quality Objectives and associated metrics as defined in 450-PG-8730.3.2, *Quality Management System Implementation for Mission Services Program*.

One of the four SCP Quality Objectives is to "Develop mechanisms to ensure that there is a continuing supply of qualified managers to support Center missions". SCP has identified existing NASA training courses and requirements to do this, as well as providing employees with challenging assignments and sometimes shifted

responsibilities. SCP has adopted the following metrics to track the development of personnel:

- Program/Project management Training (liberally defined as any training directly related to program management):
  - Percentage of Program/Project Personnel completing 40 hours of Program Management annual training for Program Management personnel (calculated at the end of the FY) [requirement from NPR 7120.5, 4.1.2.e].
  - Percentage of Program/Project Personnel completing at least 80 hours of additional training (calculated at the end of the FY) [recommendation from NPR 7120.5, 4.1.2.e].

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The figure above shows the percentage of employees by project, and program wide, that have completed GLEs at the end of FY 03.

Quality Objectives (from page 8)

- Percentage of Program/Project Personnel who have completed the NASA Academy of Program and Project Leadership (APPL) classes <<http://appl.nasa.gov/businessunits/career/classroom/index.html>>: Project Management, Advanced Project Management, Program Management, Business Education Program, and Strategic Business Management.
- Percentage of Program/Project Personnel who have completed the Source Evaluation Board class.
- Percentage of Program/Project Personnel who have completed the Continuous Risk Management class.
- Percentage of Program/Project Personnel who have completed the Goddard Leadership Education Series (GLES).
- Percentage of Program/Project Personnel who have completed either the Management Education Program or Managing the Influence Process.

SCP supervisors are actively encouraging their employees to take the 40 hours per year of program management training and complete the courses above.

FY 03 is the first year this information was collected and presented in this manner. FY 03 included a major portion of the program staff involved in the Near Earth Networks Services RFP development and evaluation. Also Code 455, the Mars Laser Communications Demonstration project, was formed.

The metric data is collected at the end of the Fiscal Year and is taken from the employees' printout of the GSFC Personnel Profiles for Training. Metric information is stored in 450-MGMT-0004 which is located on the Centralized Configuration Management System <<http://gdms.gsfc.nasa.gov/gdms/pls/appmenu>>.

*By Kevin McCarthy*

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## ***Automated External Defibrillators in the NENS Workplace***

Each year sudden cardiac arrest (SCA) strikes approximately a quarter-million people in the U.S. alone. The majority of these people have no warning, since they did not exhibit prior symptoms. And, sadly, fewer than five percent survive, often because emergency medical services cannot reach them in time.

When sudden cardiac arrest strikes, the electrical system of the heart short-circuits, most often causing an abnormal rhythm known as ventricular fibrillation. Lacking proper blood flow, the person loses consciousness, stops breathing, and will die unless promptly treated. Cardiopulmonary resuscitation (CPR) can help a person in cardiac arrest, but it alone cannot save lives. A "shock" from a defibrillator — defibrillation therapy — is needed to restore the heart's normal pumping rhythm. A victim's best chance of surviving SCA is to receive that shock within five minutes of collapse.

### **Automated External Defibrillator, The Movement to Save More Lives**

Over the last 20 years, there has been a widespread effort to move defibrillators into communities where they can be accessed and used by trained citizens, who might be present at the onset of SCA or first on the scene. To that end, Automated External Defibrillator (AED) manufacturers are producing easy-to-use automated external defibrillators to enable almost anybody to treat SCA quickly and effectively, wherever it happens — at work, at play, in the air — providing the power to save a life.

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Defibrillators (from page 9)

### The HeartStart Defibrillator

Philips, the leader in defibrillation technology, designed the HeartStart Defibrillator for the ordinary person in the extraordinary moment.

Their innovative technology, based on extensive research and user feedback, has produced a defibrillator so easy to use that, with minimal training, you can potentially save the life of a co-worker, friend, or anyone else stricken with SCA. Based on this and other information provided by the American Heart Association (AHA), the American Red Cross (ARC) and other Emergency Care organizations, Honeywell Technology Solutions Inc. has selected the Philips HeartStart OnSite Defibrillator for use in the NENS workplace.

### HeartStart OnSite Defibrillator

Weighing just 3.3 pounds, this small and lightweight defibrillator can be easily carried to the patient's side. Using clear, natural voice instructions, the HeartStart OnSite Defibrillator guides you, the first caregiver on the scene, through each step of defibrillation and CPR. Integrated SMART Pads placed on the patient's bare skin transmit information to the defibrillator, which senses and adapts to your actions every step of the way.

HeartStart OnSite includes proven technologies for heart rhythm assessment (SMART Analysis) and defibrillation energy delivery (SMART Biphasic). And like all HeartStart defibrillators, it can be used to treat infants, children and adults.

#### Easy to Use

Using the HeartStart OnSite Defibrillator is simple. Pulling the green handle powers-up the defibrillator and activates voice instructions. These instructions are paced to your actions, to help guide you through the entire process, from placing pads on the patient to delivering a defibrillation shock.

HeartStart OnSite determines if a shock is needed, based on its automated assessment of the victim's heart rhythm.

If a shock is needed, the defibrillator directs you to press the flashing orange "Shock" button. Then, HeartStart OnSite delivers a dose of low-energy

biphasic therapy, a highly effective defibrillation waveform that is also gentle to the heart.



*HeartStart FR2 Pictured*

If a shock is not needed, the OnSite Defibrillator instructs you to assess the patient and to perform CPR when necessary. While performing CPR, the defibrillator's voice instructions can be activated to coach you on the frequency and depth of compressions.

HeartStart OnSite also reminds you to call emergency medical services (EMS). And, should EMS need a summary of care, it can be retrieved from the defibrillator's internal memory. An EMS provider simply presses the "i-button" and HeartStart OnSite verbally recounts events from its last clinical use.

#### Ready When Needed

HeartStart OnSite is powered by a simple, safe, long-life (four-year) battery, the same technology used in cameras. Just click the battery in place, and the defibrillator is standing by, ready for use.

Between uses, the defibrillator performs daily, weekly, and monthly self-tests of its electrical components, subsystems, and battery to help ensure continued reliability and readiness. A pads integrity test, which checks daily that the cartridge is properly installed and that the defibrillator pads are in working order, provides an additional level of assurance.

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*Defibrillators (from page 10)*

As long as the green "Ready" light on the defibrillator is blinking, you can be certain the HeartStart OnSite is ready for use. If any part of the defibrillator needs attention, the "Ready" light turns off and the defibrillator "chirps" to alert you. Pressing the flashing blue "Information" button provides verbal guidance to help you identify and correct the situation.

Thanks to Philips HeartStart Defibrillators for the data and information provided to support this article. To learn more about Philips HeartStart Defibrillators, or other technical information regarding AEDs, visit their website at:

<http://www.medical.philips.com/main/products/resuscitation/products/onsite> .

**By Janis Stengle**





## Customer Commitment Office

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## Interagency Operations Advisory Group

The Sixth IOAG Meeting (IOAG-6), to be held in early June, will be hosted by the Japan Aerospace Exploration Agency (JAXA), at its Tsukuba Space Center (TKSC), located in Tsukuba Science City, Japan.

NASA representatives to the IOAG include James A. Costrell of NASA Headquarters' Office of Space Flight (Space Communications); Jon Z. Walker, of the GSFC Space Communications Program (SCP); Messrs. Richard Miller, Warren Martin, and Wallace Tai of the NASA Jet Propulsion Laboratory's Deep Space Mission System (DSMS) Plans and Commitments Program Office; and contractor personnel.

The IOAG is designed as a forum for issues related to space communications that extend across multiple space agencies worldwide. The IOAG provides the opportunity for identifying common needs, coordinating space communications policy, high-level procedures, technical interfaces, and other matters related to interoperability and space communications across worldwide tracking and data acquisition assets. Participating agencies to the IOAG include the Agenzia Spaziale Italiana (ASI) – the

Italian space agency, the Centre National D'Etudes Spatiales (CNES) – the French space agency, the Deutschen Zentrum für Luft- und Raumfahrt (DLR) – the German space agency, the European Space Agency (ESA), the Japanese Aerospace Exploration Agency (JAXA), and NASA.

The IOAG relies primarily on technical work already completed by other organizations developing standards for space systems such as the Inter-Agency Consultative Group (IACG), the Consultative Committee for Space Data Systems (CCSDS), and the Space Frequency Coordination Group (SFCG). When a deficiency is discovered, the IOAG may recommend to those standards organizations that they include these areas in their plan of work. Items involving just two agencies are better covered in existing bilateral venues, such as Interagency Tracking, Communications, and Operations Panels (ITCOPs). IOAG member agencies holding bilateral discussions with other agencies, whether they are IOAG members or not, report those results back to the IOAG for the benefit of the entire group.

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**During previous meetings, the IOAG has generated various recommendations and proposals, including:**

- A liaison statement from the IOAG to the CCSDS Management Council *Concerning Finalizing and Adopting CLTU, RAF, and RCF Blue Books, and SLE Application Program Interface [API] Blue Books*
- A liaison statement from the IOAG to the CCSDS Management Council *Concerning CCSDS Blue Books for CLTU, RAF, and RCF*
- A liaison statement from the IOAG to the CCSDS Management Council *Concerning Defining Acceptable Methods for Exchanging Radio Metric and Orbit Data Among Agencies*
- A liaison statement from the IOAG to the CCSDS Management Council *Concerning Development of a Standard for the Exchange of Tracking Data between Agencies with Particular Emphasis on Pre-processed Off-line Data*

Other recommendations and proposals have also been documented.

*IOAG (from page 12)*

The first IOAG was hosted by the NASA representatives (Mr. Costrell; Roger Clason of NASA's GSFC Space Communications Program; and Mr. Miller), at NASA's JPL in Pasadena, California. Subsequent IOAGs were held at the German Aerospace Center (DLR) in Germany, at CNES in France, at ESA in Germany, and last year at GSFC. The participating agencies agreed these meetings have been very productive and have allowed inter-agency cross-support to continue.

For more information visit the IOAG web site at <http://www.ioag.org/>.

**By Jon Walker**

## Mission Services Customer Forum

The Mission Services Customer Forum (MSCF) continued its successful program of meetings. The Eighth MSCF (MSCF #8) was convened at 1:30pm on March 18, 2004, in GSFC's Building 3 Goett Auditorium. MSCF#8 attendees and participants included representatives from the SCP's customer base; NASA Headquarters' officials; project and program representatives; Customer Commitment Office (CCO)/Code 451 Mission Commitment Managers (MCMs); contractor representatives; and other service providers.

Opening remarks were presented by Phil Liebrecht, Associate Director/Program Manager for Space Communications. Phil Liebrecht presented the new Space Communications Program (SCP) (formerly

Mission Services Program [MSP]) organization and discussed major SCP changes; Mars Telecommunications Orbiter (MTO) program; future mission space communications needs; and space communications enabling the future.

Featured topics included the proposed *SCP/Code 450 Architecture – Near-term Roadmap*, presented by Ronna Brockdorff/ITAES on behalf of Frank Stocklin/SCP's Chief Architect; and *Overview of GSFC's Simulation Operations Center (SOC)/Radio Frequency (RF) SOC/Data Evaluation Laboratory (DEL)/Compatibility Testing*, presented by Youn Bae/Code 451.

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MSCF (from page 13)

System status updates were provided for:

- Ground Network (GN), presented by Roger Clason (including Performance Status Update; NOAA/GSFC Collaboration; ASF Failed Antenna; Merritt Island Replacement Status; and GN Budget);
- Space Network (SN), presented by Tom Gitlin (including Performance Status Update; Demand Access System [DAS]; SN Web Services Interface [SWSI]; Space Network Access System [SNAS]; Second Guam Antenna System [SGAS]; Bilateral Ranging Transponder System Augmentation [BRTS-A]; and Space Network Internet Protocol Services [SNIS]);
- NASA Integrated Services Network (NISN) Services, presented by Chuck Duignan/Code 291;
- Center Network Environment (CNE) Issues, presented by Vince Turner/RSTX;
- Data Services Management Center (DSMC) Status, presented by Bob Hudgins/NENS; and JPL/Deep Space Mission Systems (DSMS) Status, presented by Gene Burke/JPL.

Enterprise updates (including Organizational Overviews; Current/Future Missions; Issues and Selected Items of Interest; and Areas for More Work) were provided for:

- Earth Science Enterprise (Code Y), presented by Ed Macie/Code 428.
- Space Science Enterprise (Code S), presented by Leslie Ambrose/Code 451 on behalf of Ron Mahmot/Code 444.
- Human Spaceflight Enterprise (Code M), presented by Bruce Schneck/NENS/HTSI on behalf of Jim Bangerter/Code 451.

The next forum is scheduled for July 22<sup>nd</sup>, 2004 at 1:00pm in GSFC's Building 3 Goett Auditorium.

For more information visit the MSCF website at <http://scp.gsfc.nasa.gov/mscf/>.

**By Al Levine**

## Human Space Flight Network Support Group

James A. Bangerter, NASA's Human Space Flight (HSF) Integrated Networks Director (ND) in the Space Communications Program (SCP) Customer Commitment Office (Code 451), led SCP and Near Earth Networks Services (NENS) contractor personnel during the highly successful HSF Network Support Group (NSG) meeting, convened March 20<sup>th</sup> through 24<sup>th</sup>, 2004 at the University Baptist Church in Clear Lake, Texas. Other SCP personnel included Roger J. Flaherty (SCP's Deputy Program Manager) and Jon Z. Walker (SCP's Deputy Program Manager for Customer Commitment/Code 451). NENS personnel included Todd Probert, NENS Program Manager, and John Grassel, NENS Customer Service Director (CSD).

The HSF NSG is comprised of various NASA centers and contractor elements; U.S. Government Agencies; and domestic and international organizations that provide support to or receive support from NASA's Human Exploration and Development of Space (HEDS) Enterprise, including all HSF support elements from GSFC; Johnson Space Center (JSC); HSF Program Offices; Kennedy Space Center (KSC); Marshall Space Flight Center (MSFC); Dryden Flight Research Center (DFRC); Jet Propulsion Laboratory (JPL); United States Department of Defense (DoD) organizations including United States Strategic Command (USSTRATCOM), Air Force Space Command (AFSPC), and United States Army (USArmy); and International Partners (e.g., Japan Aerospace Exploration Agency [JAXA], European Space Agency [ESA]).

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*HSFN Support Group (from page 14)*

The March 2004 HSF NSG's focus was directed toward integrated networks support of NASA HQ's HEDS Enterprise (Code M) Return To Flight (RTF) activities.



The primary goal of the HSF NSG is to provide an integrated approach to highly reliable, top-quality network services to HSF missions. The NSG provides the forum for comprehensive review of previous missions, engineering and operation issues, long-term planning, policy, and requirements, with participation from a variety of HSF organizations, including the International Space Station Program and Space Shuttle Program. Specific objectives of the NSG include performance assessment of the various HSF support entities during pre-mission, mission, and post-mission support phases. The NSG will engage in planning, establishing, and/or influencing the operations philosophy of HSF networks support via discussion and subsequent agreement among representatives during working group sessions.

While the main HSF NSG meeting occurred on March 24<sup>th</sup>, various splinter group meetings were convened during the previous three days to address and/or review the status of the following:

- Very High Frequency (VHF) services for the ISS and Soyuz spacecraft
- HSF Network Operations Directive (document review)
- Space Shuttle External Tank (ET) Television (TV) Requirement
- HEDS Communications Working Group
- Launch Simulation Review

- Contingency Ultra High Frequency (UHF) Communications Support (to examine what options may exist to maximize the possibility of establishing UHF communication with the Orbiter in the event of an S-band Air-to-Ground [A/G] failure)
- White Sands Space Harbor (WSSH) Capabilities
- ISS TDRSS Scheduling during Contingency Operations
- Air Force Satellite Control Network (AFSCN) Remote Tracking Station (RTS) Support
- New/Potential Requirements for RTF
- Automated Support Requirements System (ASRS) Web-based Requirements System

Over 100 civil servants and contractor personnel attended the March 2004 HSF NSG. Individuals recognized for significant accomplishment, expertise, and support provided to the HSF Program included Gary A. Morse of JSC's Space Communications Integration Office (who has accepted a position with NASA Headquarters); Dave Simonson from the 45<sup>th</sup> Space Wing/Eastern Range (who announced his impending retirement); and John Smith of Booz-Allen & Hamilton (BAH), formerly on the CSOC contract but recently moved to the CCO's Special Projects and Missions. The next meeting is tentatively planned for the week of September 20<sup>th</sup>, 2004.



For more information on the HSF NSG, contact visit the HSF NSG web page at <http://msp.gsfc.nasa.gov/hsfnsg>.

**By Jim Bangerter**

### **A NOTE FROM THE HUMAN SPACE FLIGHT INTEGRATED NETWORKS DIRECTOR**

Shortly after the Space Shuttle Columbia accident, the SCP's Human Space Flight (HSF) Team refocused its activities aimed at maintaining the Integrated Networks proficiency levels and ensuring our readiness for the Space Shuttle fleet's Return To Flight (RTF). The Team has participated in numerous proficiency simulations involving the Flight Dynamics Facility (FDF), White Sands Complex (WSC), and Network Integration Center (NIC). These simulations are being scheduled on a monthly basis.

In addition to our monthly simulations, we have participated with JSC in simulating the activation of the Emergency Mission Control Center (EMCC), which moves control of a Space Shuttle mission from the Johnson Space Center (JSC) Mission Control Center (MCC) to Kennedy Space Center (KSC) in the event of a catastrophic event. The Team has been actively involved in planning for a Launch Countdown Test simulation during the April/May time frame. We are also planning tests and proficiency exercises utilizing the Space Shuttle Portable Spacecraft Simulator (PSS) in conjunction with the Shuttle Training Aircraft (STA). These exercises will provide realistic Launch and Landing scenarios for ground station personnel. Anomalies induced at the various sites will test operations support personnel knowledge, and provide indicators of where additional training is needed.

Additional work for RTF includes development of a new requirement to support Space Shuttle External Tank Television (ETTV). This new requirement was supported as a PAO event during the STS-112 mission. For STS-114, the Ground Network (GN) stations at Merritt Island (MILA), Ponce de Leon (PDL), and Wallops Flight Facility (WFF), and the Jonathan Dickinson Missile Tracking Annex (JDMTA) station (near West Palm Beach, FL) will receive and record the ET TV link in real-time. MILA, WFF, and JDMTA will relay this TV link to KSC in real time for distribution.

The HSF Team continues to provide support to the International Space Station (ISS) as required. We successfully supported the Soyuz launch in April. A new relief crew, consisting of one Astronaut and one Cosmonaut, was lifted to the station to replace the crew currently residing on the ISS.

We are heavily involved in the planning and preparation for compatibility testing for the European Space Agency (ESA) Autonomous Transfer Vehicle (ATV), and the Japan Aerospace Exploration Agency (JAXA) H-IIA Transfer Vehicle (HTV). These two vehicles will provide unmanned provisions support to the ISS, including re-boost capability, and will be supported via the Tracking and Data Relay Satellite System (TDRSS).

The HSF Team is dedicated to maintaining the highest level of proficiency and will be ready to support when STS-114 lifts off in March 2005.

*By Jim Bangerter*

## ***SCP Inter-Center Coordination Activities***

To promote cooperation and coordination among users and providers of National Aeronautics and Space Administration (NASA) tracking and data acquisition assets, a Customer Commitment Working Group (CCWG) was formed. The Space Communications Program (SCP) Deputy Program Manager for Customer Commitment/Code 451, represents the SCP at the CCWG in defining support for missions, projects, and programs requesting utilization of NASA's Space Communications and Data Systems (SCDS) resources.

The most recent CCWG meeting was convened in February 2004 at NASA's Dryden Flight Research Center, CA. Significant topics discussed and/or defined included:

- Review and Status of SCDS Field Centers and Primary Contractors;
- Defining Interfaces Between SCDS Field Centers and Service Providers;

*continued on page 17*

*Inter-Center Coordination (from page 16)*

- Defining Processes for Obtaining Services from SCDS Field Centers;
- "Enterprise MOA" Status (*MOA for Management of NASA's Space Communications Network* [dated May 2002], currently under review among the NASA Enterprise Program Executives [PE]), including definition of CCWG activities;
- CCWG Roles, Responsibilities, and Future Activity;
- Need for bilateral inter-center Memorandums of Agreement (MOAs), Memorandums of Understanding (MOUs), or Letters of Agreement (LOAs); and
- Reciprocal Tracking Services with other world-wide service providers (including current NASA HQ Strategy).

Informally entitled the SCDS Customer Commitment Working Group (CCWG), the respective SCDS center customer commitment process owners and managers convene as necessary to analyze requests for services and/or support via NASA's SCDS resources. SCDS resource requirements are managed at the following NASA field center organizations:

- Dryden Flight Research Center (DFRC) - Program Manager, Western Aeronautical Test Range (WATR), Code M.
- Goddard Space Flight Center - Deputy Program Manager/Customer Commitment (Code 451), for Ground Network and Space Network support.
- Jet Propulsion Laboratory (JPL) - Deputy Manager, DSMS Plans & Commitments Program Office (Office 920), for Deep Space Network support.
- Marshall Space Flight Center (MSFC) - for NASA Integrated Services Network (NISN) (AD33) support.

The organizations above participate in the CCWG, with the following customer group representatives:

- Glenn Research Center (GRC) - Space Communications Office (Office 6100).
- Johnson Space Center (JSC) - Mission Operations Directorate (DA7).
- Kennedy Space Center (KSC) - Communications Services Branch (IT-D2).
- Marshall Space Flight Center (MSFC) - Ground Systems Department (FD40).

#### **ATTENDEES AT THE FEBRUARY 2004 CCWG**

*included Joseph M. Aquino of JSC's Mission Operations Directorate/DA7; James A. Bangerter of GSFC's Customer Commitment Office, Code 451; Robert N. Bradford of MSFC's Ground Systems Department/FD40; Gene L. Breazier of NISN/UNITeS (DFRC/JPL Representative); James A. Costrell of NASA HQ's Office of Space Flight (Space Communications)/M-3; Joe A. Finney of MSFC's NISN Customer Service (UNITeS); John E. Grassel of GSFC's NENS Customer Service (HTSI); Jewel R. Hervey of JSC's Mission Operations Directorate/DA7; Reginald K. Hunt of GSFC's Space Communications Program (PAAC-II/SGT Inc.); Jerry C. McKee and Jan E. Minniear of DFRC's WATR/Code F; Elizabeth G. (Beth) Paschall of MSFC's NISN Project Office/AD33; Larry J. Schilling of DFRC/Director of Research Systems Directorate/Code F; Gary L. Spradlin of JPL's DSMS Plans & Commitment Program Office/920; and Kerry P. Webb of MSFC's UNITeS organization.*

The primary role of the CCWG is to coordinate and report on NASA's SCDS center activities related to mission planning, requirements analysis, feasibility assessments, cost estimates, and loading studies. Based on the information it receives from the technical assessments of the service/support requests, the CCWG:

- Establishes the customer's primary interface for service/support through the "Lead Center."
- Enables initial technical/feasibility analysis and cost estimates.
- Provides early identification of requests for unique or expanded services.
- Advises and assists SCDS management personnel in the preparation and maintenance of the SCDS Mission Set, for approval by respective NASA Enterprise PEs.
- Ensures requirements are documented agency-wide.
- Provides feedback to NASA Headquarters' Space Communications Coordination and Integration Board (SCCIB) on the interfaces among the networks, contractors, and field centers.

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## Space Communicator

*Inter-Center Coordination (from page 17)*

- Recommends processes that work well at one Center for implementation at other Centers.
- Alerts the SCCIB to procedural and contractual impediments to efficient operation of the Centers.
- SCDS Business Office - Representatives from the NASA and contractor elements.
- Other participants as necessary for the efficient operation of the CCWG.

Typically, CCWG meetings include representatives from:

- NASA center service management personnel as appropriate for CCWG agenda items.
- NASA Headquarters - Contractor management personnel and Program Executives.
- Contractors - including customer service representatives, as applicable.

The CCWG will address cross-cutting mission support issues that span the agency tracking and data acquisition service providers. The goal is to provide the best possible support to NASA customers in the most cost effective, efficient manner possible.

For more information visit the SCDS CCWG web site at <http://msp.gsfc.nasa.gov/cccmwg/>.

**By Jon Walker**





## Space Network Project

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## ***SN Quarterly Review***



Code 452 held the 3rd Space Network (SN) Quarterly Review (SNQR) at the White Sands Complex (WSC) in New Mexico on January 29th, 2004. The review serves as a forum to discuss status and to communicate with SN management. Topics discussed at the review included NENS contract transition status, NENS contract management, SN Core status, SN Task Order (TO) status, TDRS Constellation status and plans, TDRS Flight Operations, SN Operations status, SN Maintenance, SN Sustaining Engineering, SN Product Development status, upcoming SN activities, and the SN Implementation Plan (SNIP) status. Action items were also discussed. The 4th SN Quarterly Review occurred April 15th 2004 at WSC.

***By Tom Gitlin***

## Second Guam Antenna System

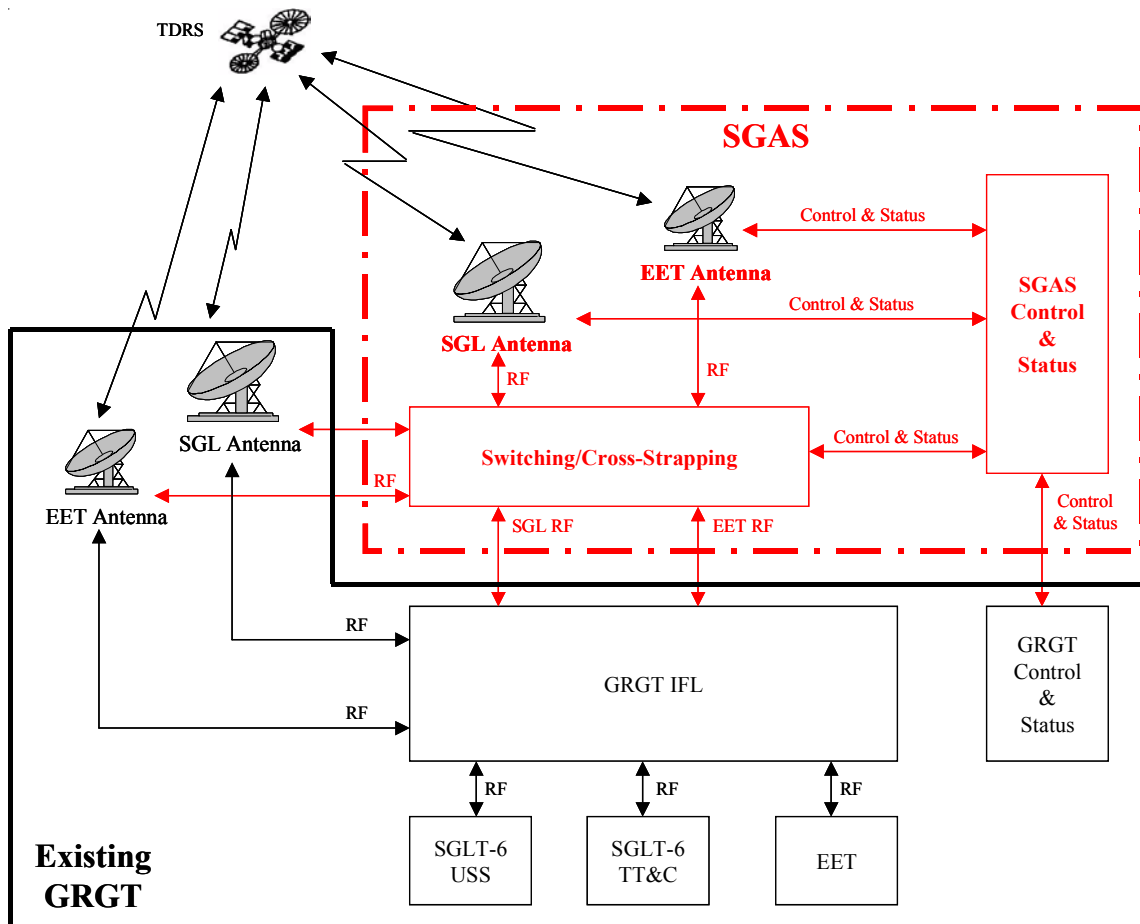
Currently, the Guam Remote Ground Terminal (GRGT) has only one Space to Ground Link (SGL) antenna and one End to End Test (EET) antenna. Should the SGL antenna fail, the station would be down for all customers until it could be repaired. To mitigate the risks of operating without redundancy, this project will add a second SGL and EET antenna for the GRGT.

This second set of antennas will be similar in capability to the existing GRGT antennas and will be located in a straight line due south of the existing antennas. Only antennas, radomes, and interconnections are a part of this project. No Space to Ground Link Terminal (SGLT) will be added; however, capabilities for interconnections will be installed to allow a future SGLT to

work with these new antennas. The requirements phase was just recently completed with the System Requirements Review (SRR) in January 2004. The project is currently in the design phase with the Preliminary Design Review/Critical Design Review (PDR/CDR) scheduled for April 26, 2004. Facilities construction will begin in September 2004. Antennas, radomes, and the interfaz link construction will begin in February 2005. Completion of all work is expected in May 2005, with operations beginning in June 2005.

*If you have any questions, don't hesitate to contact Andre Fortin, email: Andre.Fortin@nasa.gov, phone: 301-286-7829.*

**By Andre Fortin**



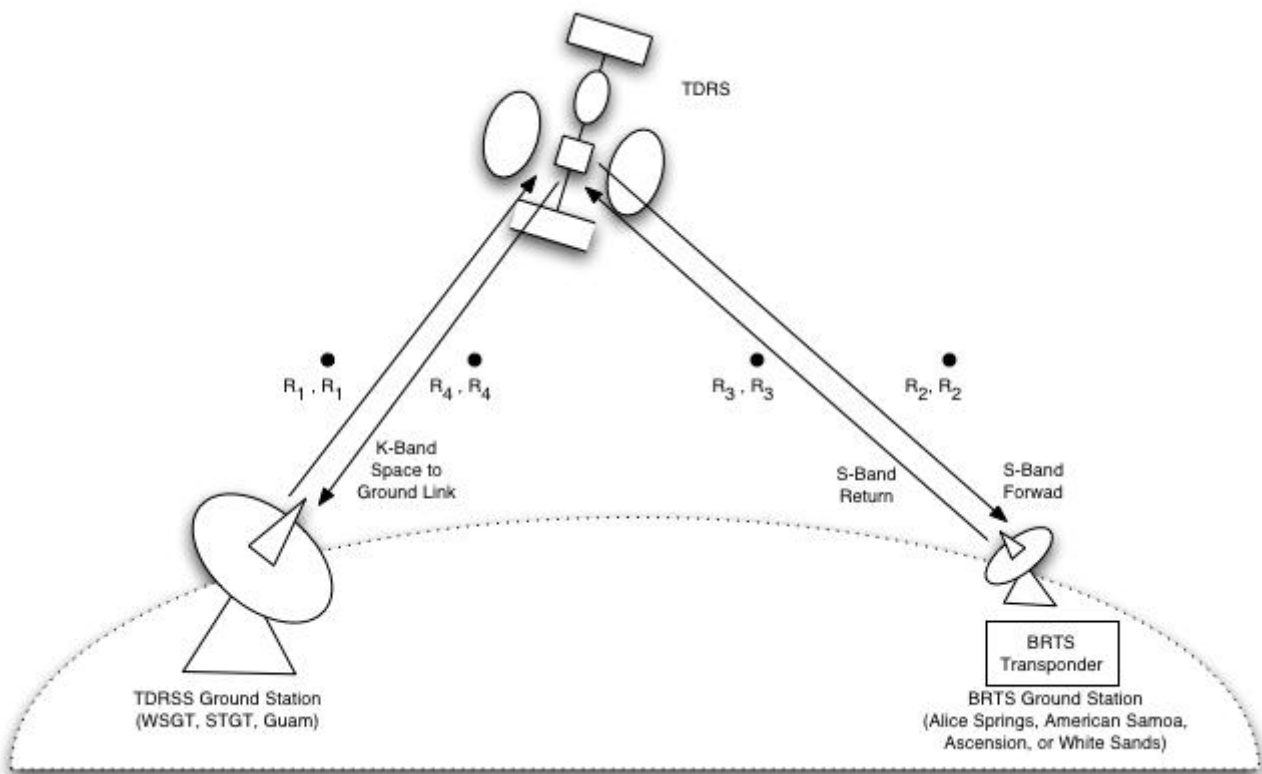
# The Bilateral Ranging Transponder System Augmentation (BRTSA) Project

NASA's Space Network (SN) consists of a constellation of nine Tracking and Data Relay Satellites (TDRSs) stationed on orbit around the globe. In order to provide metric tracking data for accurate determination of the ephemerides for the complete TDRS constellation, the Bilateral Ranging Transponder System (BRTS) is used. The BRTS is composed of a transponder, a telemetry subsystem and an antenna. All NASA enterprises (Earth Science, Space Science, and Human Space Flight) and other potential SN customers rely

on the accuracy of the TDRS system to determine the orbits of user spacecraft and therefore must also rely on the BRTS being functional at all times.

The current BRTSs are aging and an augmentation effort is being undertaken. The transponders will be replaced with modern units that meet requirements. This effort will ensure that all BRTSs are ready and able to support all of our customers.

**By Donna Sadof**



*Bilateral Tracking of TDRS*

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### **Green Belt Team Success: Improved Reliability of the WSC-STGT Chiller Plant**

On December 24, 2003, the Chiller Plant at the White Sands Complex-STGT reached a new operational milestone: one year without a failure. This milestone is significant because the Chiller Plant at the White Sands Complex has a long history of chiller failures. These failures have received attention over the years, but all the attention never led to increased reliability. That changed in the fall of 2002, when Facilities Operations Manager Art Corella made the Chiller Plant problems a Green Belt Project using Honeywell's Six Sigma Program to meet the challenge.

Commissioned in 1988, the Chiller Plant experienced a steady increase in building cooling load associated with growth in users and capability. The increases in building cooling load necessitated greater reliability of the chilled water system. However, the system was becoming less reliable. In 2001, the Chiller Plant experienced nine failures. The situation was precarious and even though the failures did not occur during the southwest desert region's high-temperature days, it was obvious that there was a significant problem. The reliability that directly affects the capacity of the Chiller Plant was in question and the local Facilities Operations section was pressed to find a solution. Intensive research was made of historic documentation to identify all failures. Historical data included reference to multiple failures and

## **WSC Achievement!**

several attempts by the Facilities Operations section to contact vendors, architects, and design engineers in an effort to arrive at a definitive cause for the frequent failures. These attempts did not yield any positive results, and left the parties involved struggling with the next step to take toward a solution.

The Facilities Operations section then chose to procure the services of an independent engineering firm, one familiar with the southwest desert environment, to assist in the investigation. Unfortunately, this option proved too costly and had to be curtailed. However, in the interim the Chiller Plant supervisory control and data acquisition system was configured to collect data from key process points. To use this data effectively in resolving the reliability issue of the Chiller Plant, it was decided to use the Honeywell Six Sigma Program. A small Green Belt Team was formed to look at reliability issues and the cost associated with the repairs required to maintain a reliable system with adequate capacity and redundancy. The metrics were gathered from technical personnel on rotating shifts. The Green Belt Team used the Six Sigma tools to define the project and establish goals, measure and analyze the data, and then improve and control the process. Process maps were developed to fully understand all processes and critical process measurements were identified. Upper and lower specification limits for critical measurements were established from the manufacturer's documentation. These specification limits were later used to analyze the data retrieved from the chiller control system. Data was retrieved from historical documentation (logbooks and the Computerized Maintenance Management System) that identified the quantity and types of failures. All failure modes were identified and failure codes were assigned to each failure. These failure modes were then analyzed using a Fishbone Diagram. The Failure Mode and Effects Analysis (FMEA) tool was used to numerically rank all failure modes based on severity and detectability of each potential failure. Process improvements were identified and implemented based on the numerical ranking from the FMEA. A Control Plan was implemented that continues to monitor the process and re-evaluate the FMEA periodically to identify additional areas for improvement.

*continued on page 23*

*WSC Achievement (from page 22)*

The Chiller Plant has now operated since January 2002 without a failure attributed to the primary failure mode, which the team identified as a lubrication failure. Based on current repair and replacement costs, an estimated \$62,000 will be saved annually. In addition, a side benefit to the project was realized with the activation of the heat recovery mode on three chillers. The local service center for the chiller manufacturer was not able to set up the heat recovery mode when the plant was commissioned and had directed the Facilities Operations section to disable the function since it was "difficult to set up and operate, and not a good system." The activation has eliminated the need to have the boiler online to heat the main operations building. The heat recovery chillers are now the primary heat source for the main building; a

by-product of the refrigeration process. This enhancement accounts for an additional \$8,000 savings per year.

In addition to Corella, the Green Belt project team included Darrell Ash and Laurel Rossow.

**By Janis Stengle**



## ***Demand Access System Update***

The Demand Access System (DAS) will expand TDRS Multiple Access (MA) return service capabilities by adding new receivers, monitoring tools, TCP/IP telemetry capabilities, and limited CCSDS data processing and distribution capabilities via the NISN IONet. The DAS uses a variety of COTS hardware and software, along with customized programs tying all the various pieces together.



The DAS team held a Full Operations Capability (FOC) review on October 7, 2003. SWSI, DAS Customers, and Customer Commitment office personnel were in

attendance. The closing recommendation was that DAS would be ready for transition to operations upon resolution of liens to the system. The major liens at the time included issues with the Avtec Programmable Telemetry Processor (PTP) which have been worked with the manufacturer and resolved. After the FOC review, the team performed additional testing and uncovered some additional liens, several of which have been resolved.

On January 1, 2004, the Near-Earth Networks (NENS) contractor, Honeywell, assumed responsibility for DAS. Honeywell has been tasked to bring the DAS into a fully operational state. These tasks involve performing comprehensive confidence testing after clearing all remaining liens. The DAS Operations Readiness Review (ORR) is scheduled for May 13, 2004.

The DAS successfully supported several Long-Duration Balloon Project events in late 2003 on a best-effort basis when the LDBP could not get service via other means. Additionally, several pre-mission tests have been successfully run with both LDBP and Swift.

Refer to the DAS website at <http://nmisp.gsfc.nasa.gov/das/> for the latest DAS information.

**By Tom Gitlin**

Ground Network Project  
Code 453 GSFC / NASA



**Ground  
Network  
Project**

New Capabilities for  
QuikSCAT Support at  
Alaska SAR Facility

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McMurdo Ground  
Station Demonstration

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Satellite Laser  
Ranging (SLR) Stations

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GN Agreements with  
NOAA for Reciprocal  
Contingency Support

**Page 28**

## ***New Capabilities for QuikSCAT Support at GN Alaska SAR Facility***

What do you do when one of your sensors begins to fail and you cannot support the required satellite load? In the world of space communications the science community depends on satellites that are in space to gather the information and transmit it to the ground. The Ground Network, which operates the world wide ground stations, is the eyes and ears for the scientists doing this amazing data gathering feat. All the tools need to work together like the human body to be efficient.

On November 28, 2003, the Ground Network experienced a catastrophic failure of one of the antennae at Poker Flat, Alaska. The loss of the PF1, 11-meter antenna meant that there was no other antenna readily available in case of another failure. With the upcoming launches of Gravity Probe-B and Aura, the forecasted load for X-band support would soon jump by about 20 to 30 passes a day.

As luck would have it, a recent failure of the ADEOS-II spacecraft (even though catastrophic) left a void in one of the apertures at the University of Alaska. The University hosts a 10-meter and 11-meter

system. The situation was that this station had only been instrumented for support of RADARSAT-1, ERS-2 and ADEOS-II.

The situation was studied and a decision was made to add the QuikSCAT support capability to the 11-meter antenna at ASF. The existing contract required modification to remove the ADEOS-II support and get the station ready to support QuikSCAT.



**QuikSCAT Satellite**

This was not going to be a snap, even though there was some compatibility, the antenna RF links were

*continued on page 25*

*QuikSCAT Support (from page 24)*

already proven, and the S-band receivers were in place. However, the receive downlink (return telemetry data) required three different data rates on the same pass.

The COTR (Medora Macie) and the ATR (Paul Garza) got to work, and within a short time were able to draft up a contract modification that defined the required work to reconfigure the station. A unilateral contract modification was issued in short order by the Contracting officer, Ann Kearny, and the Engineers were given a task to proceed with the work of getting ASF ready for QuikSCAT.



**Alaska SAR Facility's 11-meter parabolic dish**

Contractor Engineers Pati Paskett and Don Hess quickly dusted off a configuration that was done for Merritt Island, Florida, found some equipment, and sent it to Alaska. The ASF engineers feverishly worked to install the bit syncs and the Programmable Telemetry Processor (PTP), and Don Hess was dispatched to

Alaska to help with the integration and training of the ASF personnel. Mr. Hess did an outstanding job and received many kudos from the ASF crew and NASA.

With the configuration of the new equipment, final alignments completed, and simulated data flowing locally, it was time for the real test of tracking and receiving the downlink from the real satellite. The shadow passes started and data started to be analyzed locally before it was sent to the Laboratory for Space Physics (LASP) at the University of Colorado in Boulder. The data distribution was tricky because this was the first time that the ASF had done real-time data transmissions.

The Standard Autonomous File Server at ASF that had been used for ADEOS-II was reconfigured to process the QuikSCAT data and distribute it to the LASP, JPL, and the NOAA facility in Suitland, Maryland. The data had to travel from Space to Alaska to Goddard Space Flight Center and then to Colorado and California. All three locations had to receive the needed files and confirm good data. Once this was done, the station was ready to start receiving the QuikSCAT downlink alone. This one spacecraft challenged the ASF people and system to the point of breaking down a few times. For a while it appeared as if it would never work; however, with persistence and hard work by the talented and enthusiastic team, it worked superbly.

The QuikSCAT project is now enjoying about seven to ten passes a day over the ASF with apparently very few problems. Even though problems can still crop up, the ASF is once again in full operation with three spacecraft to support daily.

**By Paul Garza**

## ***McMurdo Ground Station Demonstration***

A demonstration is underway to deliver high-rate, high-volume data to customers in a different and faster method using McMurdo Ground Station (MGS) and McMurdo TDRS Relay System 2 (MTRS2).

With this demonstration, Radarsat data dumps will be directed to an upgraded high-speed telemetry system (with a 240GB RAID), which will frame sync and store the data on LTO tapes (200 GB) using a newly installed

LTO tape library. These tapes will take the place of the existing AMPEX tape storage. Along with shipping LTO tapes to the Radarsat data facility in Alaska, the Radarsat data can be delivered over TDRS via MTRS2. At White Sands Complex (WSC), a new and similar high-speed telemetry system (with LTO tape library) is available to receive and record the Radarsat data from

*continued on page 26*

McMurdo (from page 25)

McMurdo onto LTO tapes. These LTO tapes can be sent to the Radarsat data facility, overnight if desired, to allow faster delivery of the data to Alaska. Normally, data to the Alaska facility from McMurdo is delayed for months when the McMurdo Station is inaccessible during the Antarctic winter.

Also, as part of this demo, direct broadcast data from Terra and Aqua can be downlinked to MGS to the high-speed telemetry system at McMurdo and hand-carried (via LTO tapes) to a new science computer located at McMurdo. This computer will process the raw data and convert it to science data products (jpegs, etc.) for the local science community at McMurdo. Additionally, these files can be hand-carried back to the high-speed telemetry system for playback into MTRS2 for relay to the US. Since the Internet bandwidth out of McMurdo is very

limited, the MTRS2 system can relay high-volume data to WSC for the science community. Special applications written for both telemetry systems at MGS and WSC will allow the transfer of high-volume telemetry data or computer files (science data files) via TDRS to WSC. Once at WSC the data can be delivered to the customer by LTO tape or DVD.

This demonstration will last from January to September 2004. After this time, the activity will become operational if it proves beneficial to operations and customers.



**McMurdo Ground Station**

**By Andre Fortin**

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## ***The NASA Satellite Laser Ranging Network***

Satellite Laser Ranging (SLR) is a fundamental measurement technique used by the NASA Space Geodesy Program to support both national and international programs in Earth dynamics, ocean and ice surface altimetry, navigation and positioning, and technology development. SLR uses lasers to make precise measurements of the range between a SLR ground station and a retro-reflector equipped satellite to millimeter level. The SLR technique was first developed by NASA's GSFC in the early 1960's as a tool for precision orbit determination and validation of radio tracking techniques. NASA has built five trailer-based Mobile Laser Ranging Stations (MOBLAS) that have remained in operation at fixed sites for over fifteen years. Two highly compact Transportable Laser Ranging Systems (TLRS), built by NASA, also remain in operations. The University of Hawaii and the University of Texas continue to operate the two high-performing Observatory SLR systems at their respective

Universities. The University of Texas system also has lunar ranging capability.

One of the key elements of the NASA SLR program is the establishment of overseas partnerships to improve the global distribution of SLR stations (see Table 1). NASA continues its successful partnerships with the Geoscience Australia (formerly Australian Surveying & Land Information Group [AUSLIG]) in Yarragadee, Australia (MOBLAS-5); the South African National Research Foundation/Hartelbeesthoek Radio Astronomical Observatory (HRAO) in Hartelbeesthoek, South Africa (MOBLAS-6); and the University of French Polynesia/CNES in Tahiti, French Polynesia (MOBLAS-8). Under these partnerships, NASA continues to provide the SLR system, training, engineering support, and spare parts to maintain operations. The host country provides the site, local infrastructure, and the operating crew.

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SLRN (from page 26)

Table 1. NASA Satellite Laser Ranging Network		
Location	SLR System	Operating Agency
Monument Peak, California	MOBLAS-4	Mission Contractor (HTSI)
Greenbelt, Maryland	MOBLAS-7	Mission Contractor (HTSI)
Mount Haleakala, Maui, Hawaii	HOLLAS	University of Hawaii
Fort Davis, Texas	MLRS	University of Texas at Austin
Arequipa, Peru	TLRS-3	Universidad Nacional de San Agustín
Yarragadee, Australia	MOBLAS-5	Geoscience Australia (formerly AUSLIG)
Hartebeesthoek, South Africa	MOBLAS-6	National Research Foundation/HRAO
Tahiti, French Polynesia	MOBLAS-8	University of French Polynesia/CNES

Although there are some slight differences in hardware, the system configurations of the NASA Network stations are very similar (see Table 2).

The NASA SLR Network has been fully operational in the field for over twenty years. During this time, the Network has seen many modifications and upgrades to maintain system operations and more importantly, to increase data quantity and quality. Through a declining budget, NASA continues to ensure system operations and performance are maintained at the highest level. During the last few years, the MOBLAS, TLRS, MLRS (University of Texas SLR system), and

HOLLAS (University of Hawaii SLR system) have received both hardware and software changes to maintain and enhance system operations. Upgrades were made to the timing subsystem, the receiver subsystem, the laser subsystem, the communications subsystem, the mount subsystem, and the processing software for the NASA SLR Network.

In summary, the NASA Network still consists of nine NASA-operated, partner-operated and University-operated stations covering North America, the west

*continued on page 28*

Table 2. System Configuration Information				
ITEM	MOBLAS	TLRS	HOLLAS	MLRS
Mount Configuration	Az/EI	Az/ EI	Az/ EI	X-Y
Laser Type	Nd:YAG	Nd:YAG	Nd:YAG	YG402DP
Primary Wavelength	532 nm	532 nm	532 nm	532 nm
Pulse Energy	100 mJ	100 mJ	140 mJ	125 mJ
Repetition Rate	4 or 5 Hz	4 or 5 Hz	5 Hz	10 Hz
Receiver Aperture Dia.	30 in.	11 in.	16 in.	30 in.
Detector Type	MCP/PMT	MCP/PMT	MCP/PMT	MCP/PMT, SPAD
Timing Standard	GPS/Steered Rb.	Cesium	Cesium	Cesium

SLRN (from page 27)

coast of South America, the Pacific, South Africa, and Western Australia. The NASA SLR Network continues to provide over 40% of the total data volume in the International Laser Ranging Service (ILRS) as well as the most precise sub-cm accuracy ranging data.

**By David Carter**



**Figure 1. MOBLAS 7 at the GSFC in Greenbelt, Maryland**

# GN Agreement with NOAA for Reciprocal Contingency Support

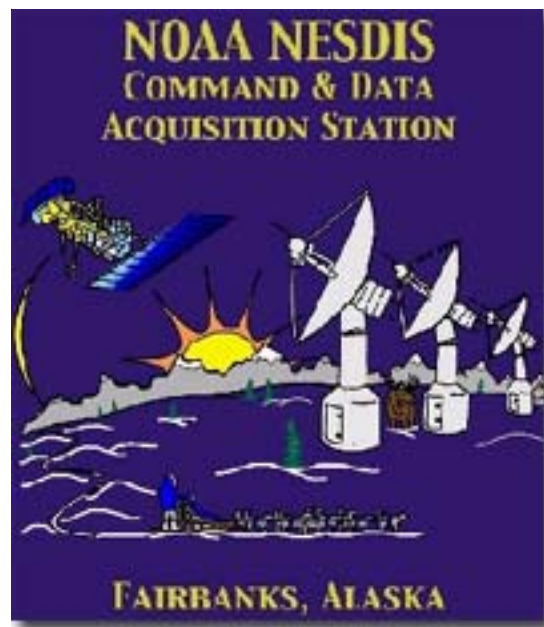
## NASA/NOAA MOU

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An agreement between the NASA Ground Network and NOAA to allow contingency support from the other agency's antennas is in the final approval stages. The "Memorandum Of Understanding Between the National Aeronautics and Space Administration's Goddard Space Flight Center and National Oceanic And Atmospheric Administration's National Environmental Satellite, Data, and Information Service Concerning Spacecraft Tracking and Data Acquisition Support" will extend through September 30, 2010.

NOAA's Command and Data Acquisition stations at Gilmore Creek, Alaska; Wallops Island, Virginia; and NOAA's Geostationary Operational Environmental Satellite (GOES) backup station at Greenbelt, Maryland, are used in support of operational weather satellites. In the event of planned and/or unplanned resource or system outages, NOAA may receive support from compatible NASA resources for maintenance of satellite health and safety and possibly recovery of mission data.

Since the NOAA stations' coverage is largely compatible with the NASA Alaska and Wallops stations, there is an opportunity for NASA to take passes at the NOAA stations on a non-interference basis. This provides additional coverage to NASA supported satellites such as the EOS missions should a ground station antenna failure limit the capacity of the NASA stations.



Engineers have already installed EOS-specific equipment at the NOAA Alaska station, and have taken some test passes. The NOAA Alaska station is already home to the EOS ERPS equipment. Engineers supported an AQUA shadow pass with the NOAA antenna on February 20th. Data compared very favorably to GN AGS.

**By Curtis Emerson**



## Tracking and Data Relay Satellite Project Code 454 GSFC / NASA



# ***TDRS Project Office TDRS Continuation Activities***

The Project has been conducting Pre-Phase A studies towards development of requirements for the next generation of relay satellites. These studies were initiated in the Spring of 2003 in response to letter direction from the Headquarters Office of Space Communication (Code M3). An interim report addressing topics in this letter was completed in December of last year and briefed to Code M3.

In parallel with these studies, the Project commissioned Aerospace in September of 2003 to perform an independent analysis of the expected longevity of the current on-orbit fleet of spacecraft. The results of this study were reviewed in early March. Since then, as various replenishment and loading scenarios are identified, Aerospace has been running "what -if" cases against the model they developed. Results from these runs have been provided to Code M3 in support of their budget planning activities.

The Project has been examining ways of providing, expanding, or improving the performance of the heritage services. Several areas where improvements in technology would offer tangible

benefits have been identified in conjunction with AETD and have been submitted as candidates for the Technology Development Program. Currently, work (with GRC and ARC participation) is in progress on an enhanced S-Band Multiple Access (MA) antenna element. The objective of this effort is to explore whether SA performance and characteristics (dual polarization, frequency tunability, and enhanced performance over a wider Field-of-View) can be achieved via the MA phased array.

The Project continues to support the Space Architect's Space Communications Working Group in support of Code M3 on definition of future spacecraft concepts and system architectures. These have included studies on the ability of the existing Space Network to support missions being developed by the Exploration Program. Currently the Project is planning on transitioning to the Formulation phase in FY' 06.

**By Jeff Gramling**  
*Formulation Manager, TDRS Continuation  
TDRS Project Office*

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*The Space Communications Program family offers it's deepest sympathies to Joanne Lodowski on the death of her husband, Kenneth, on May 7. Our thoughts are with Joanne and her family at this time.*

## SCP People & Announcements



SCP welcomes Mike Kelly who is on detail from Code 480 as the Program Business Manager for Code 450. Mike is sitting in for Dennis VanderTuig who is on detail as the Project Manager for Formulation for IFM. Mike has been at Goddard for 31 years and served as the DPMR for the TDRS Project from 1992 to 1997. Mike is married to Cindy Kelly who is the Associate Chief for Code 903, Administration and Resources Management Office.

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*Congratulations* to Paul McCeney (451), on receiving his 50-year service award from Administrator Sean O'Keefe. The award reads, *"In grateful recognition and appreciation of faithful service to the National Aeronautics and Space Administration and to the Government of the United States of America"*, dated February 23, 2004. Our thanks and appreciation are also extended to Paul on his extraordinary achievement.



(l to r: Jon Walker, Paul McCeney, Phil Liebrecht)



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*The Ground Network Project welcomes* Linda Layton. Starting in June 2003, Linda has provided matrix support to the GN from Code 153. Linda was selected as the Ground Network Suborbital Service Business Manager in January 2004. Linda had been at Wallops for 30 years, 27 of those years as a civil servant. Linda has made many improvements in the Suborbital Services Office already and we extend a warm welcome and a big 'Thank You' to her.

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*Congratulations* to James Burd (451) on his acceptance to the University of Maryland for the Fall semester. His major will be Computer Science. He is a Phi Theta Kappa and currently attends Prince Georges Community College.



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*Welcome* John Weiss (567/451). John is matrixed from Code 567. He will be assisting Al Levine/451 with network loading analysis and feasibility assessment. John has been at Goddard since 1992.



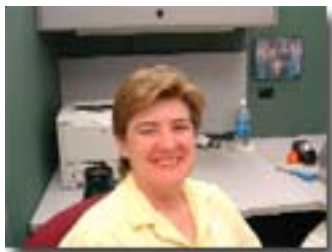
*Congratulations* to the Flaherty family. Roger Flaherty (450) got to be Father of the Bride with the marriage of his daughter, Erin, to Matthew Gotterer on May 22.

*SCP welcomes* Kim Tann, Resource Analyst for the Space Network. Kim has been at Goddard for three years and comes to the SN from Procurement, Code 210.5. Her previous experience included working at the Department of Treasury. She is a graduate of the University of Maryland and will be working Technology, NENS, and ITT.



*GN welcomes* David Carter as the Satellite Laser Ranging (SLR) Network Services Manager. The SLR program was recently transferred from Code 920 (Laboratory for Terrestrial Physics) to Code 453, Ground Networks Project. Mr. Carter began his career at GSFC in 1984 for the Microwave Sensors Branch (Code 975). In 1987, Mr. Carter began working for the Laser Remote Sensing Branch (Code 924).

*Welcome* LaVada G. Harris (452 and 455). LaVada will be performing a dual role as admin support for both the Space Network and Mars Optical. She comes to SCP with a wealth of experience. She began as a summer intern in the summer of 2001 by being a typist for a deaf student who did not read lips or sign. Her other assignments have included RSDO, Earth Explorers, and JWST.



*SN/GN welcomes* Peggy Reno, who is a contractor employed by SRS Technologies. She is the NENS Space Network/Ground Network Quality Engineer and is a newcomer to Goddard.

*Welcome* Donna Montgomery-Bowling. She is a Resource Analyst for MLCD, Code 455. She came from Code 900.3 and has been at GSFC for 6<sup>1/2</sup> years.





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Previous issues of this publication, formerly  
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in the newsletter archive.

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